Ruptured mycotic infrapopliteal aneurysm

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Mycotic aneurysms involving infrapopliteal arteries are rare. Ruptured infrapopliteal aneurysms are particularly uncommon and represent a surgical or endovascular emergency. We describe a case of 51-year-old male who presented with a 12-cm ruptured aneurysm of the tibioperoneal trunk 5 years after an episode of bacterial endocarditis. Our surgical approach included using extremity exsanguination and tourniquet to control hemorrhage during aneurysm ligation, followed by successful arterial reconstruction. Review of the English literature suggests that this is the largest ruptured infrapopliteal aneurysm reported. (J Vasc Surg 2013;58:205-7.)

CASE REPORT

A 51-year-old male was transferred to our hospital with the complaint of acute pain and swelling of the left leg (Fig 1). Evaluation at the referring hospital included computed tomography (CT) angiogram that demonstrated a 12-cm below-knee arterial aneurysm with contained contrast extravasation and erosion of the adjacent tibia (Fig 2). The patient had complained of discomfort and tenderness over this area for several months but denied any constitutional symptoms, including fevers and chills. He did not seek medical attention until the mass started to rapidly expand. Five years prior to this event, the patient was treated for bacterial endocarditis at another institution. He underwent aortic valve and mitral valve replacement with porcine valves. At that time, the blood cultures were positive for *Staphylococcus aureus*, and the patient received a full course of 6 weeks of intravenous antibiotics. His hospital course was complicated by septic emboli that resulted in a stroke, and he had a difficult recovery with prolonged need for ventilator support and ultimately required a tracheostomy and gastrostomy. Subsequently, he fully recovered with the exception of mild cognitive deficits and lived independently in the community.

On arrival at our institution, he was hemodynamically stable and was in moderate distress because of severe discomfort of the left leg. His leg was cool with normal motor function but diminished sensation. A femoral pulse was present, and there was faint Doppler signal at dorsalis pedis. There was significant soft tissue edema and erythema of the entire leg. Because of the radiologic evidence of arterial rupture and evidence of distal tissue ischemia on physical examination, the patient was emergently conveyed to the operating room. There were no three-dimensional reconstructions, and the only available axial CT images did not clearly delineate the infrageniculate arterial anatomy. At that time, our working diagnosis was ruptured mycotic popliteal artery aneurysm.

Fig 1. Large pulsatile mass in the medial part of the left calf.

The operative approach included right greater saphenous vein harvest, with exposure of the left distal superficial femoral artery (SFA) and the posterior tibial artery at the ankle to prepare for bypass. The distal posterior tibial artery was chosen as a target because of the proximal cellulitis and concern for wound healing in the setting of infection. Once proximal control was obtained at the distal SFA, we incised the aneurysm through the medial incision. The aneurysm was opened and decompressed. There was organized thrombus without evidence of purulence, and multiple cultures were sent, including tissue from the aneurysm sac and bone sample. The leg was then exsanguinated with elastic bandage, and hemostasis was obtained with a tourniquet above the knee. Leg exsanguination and tourniquet technique were used to provide distal arterial and venous control, as the infrageniculate anatomy was unclear and large size of the aneurysmal sac obscured normal anatomy. Tibia was incorporated as the medial wall of the aneurysmal sac, and there were no clear tissue planes between the chronically inflamed wall of the aneurysm and neurovascular structures. The aneurysm was ligated from within the sac, and vascular continuity was restored with a reversed contralateral saphenous vein graft from the SFA to the distal posterior tibial artery. The graft was tunneled posteriorly in a subcutaneous fashion as to avoid the incision for the aneurysm. The SFA was ligated and divided.

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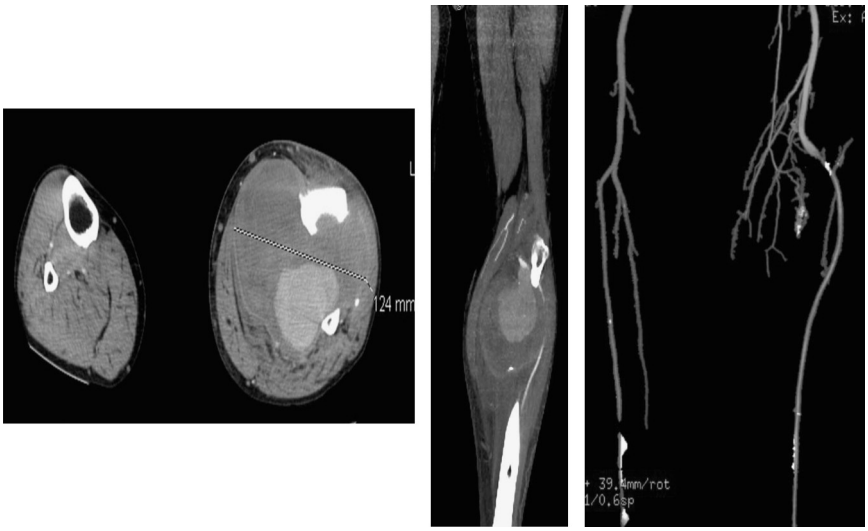

Fig 2. Computed tomography (CT) of the left calf showing tibioperoneal trunk artery aneurysm with contained extravasation and erosion of the adjacent tibia. The aneurysm measures 12 cm in diameter.

Completion angiogram showed a patent graft, patent distal anastomosis, and flow to the foot (Fig 3). Once complete hemostasis was obtained, closure of the wound was performed with a closed suction drain in the aneurysm sac that was brought out through a separate stab incision. Postoperative recovery was uneventful. There were no microorganisms recovered from intraoperative cultures, including bone cultures. Perioperative antibiotics included vancomycin and piperacillin/tazobactam and were discontinued because of the negative blood cultures and absence of any systemic infection including fevers and leucocytes. Orthopedic surgery was consulted to comment on chronic erosion of the tibia. Their decision was not to treat this process as osteomyelitis but as of degenerative process secondary to mass effect. The patient was discharged home on postoperative day 6.

The patient recovered well and underwent serial follow-up examinations with graft surveillance duplex ultrasounds at 3, 6, and 12 months postoperatively. At 1-year follow-up, he was noted to have increased velocities in his distal graft on duplex examination. This led to an angiogram that showed patent bypass with a sclerotic retained valve and most interestingly showed continuity of the anterior tibial artery to the ankle. Based on this information and reviewing the new reconstitutions from the preoperative CT angiogram, this was determined to have been a ruptured aneurysm of the tibioperoneal trunk. The patient also had an anomalous high origin of the anterior tibial artery, which remained well perfused by collaterals after distal SFA ligation.

Fig 3. Completion angiography showing reversed saphenous vein graft from the distal superficial femoral artery (SFA) to the posterior tibial artery.

DISCUSSION

The etiology of mycotic aneurysms associated with bacterial endocarditis or arterial injury is well described and documented in the literature.[1] Peripheral mycotic aneurysms are rare and only described as case reports.[2-5] Because of its rarity, the natural history of infrapopliteal aneurysms is unknown. Most case reports describe initial patient presentation with symptomatic leg edema and pulsatile mass.[2-4] Rupture of a popliteal or infrapopliteal aneurysm is extremely uncommon, and there are only two case reports describing a rupture of tibial aneurysm in the English literature.[5,6] The 12-cm aneurysm described in our case report is the largest reported aneurysm of this type.

With the history of prior bacterial endocarditis complicated by cerebral septic emboli, the most likely etiology of our patient's tibioperoneal aneurysm is mycotic, although no microorganisms were recovered. Positive cultures are identified only in about one of four cases of clinically

infected aneurysms.[1] Whether this represents a less virulent organism or a "burned-out" aneurysm with remote history of appropriately treated bacterial endocarditis is difficult to determine. Five years ago prior to the current presentation, the patient underwent definitive treatment with a 6-week course of appropriate antibiotics and replacement of the affected cardiac valves. Afterward, he denied any history of trauma or injury to this leg. Follow-up surveillance CT scan did not show aneurysms in other arterial beds. Our hypothesis is that this was mycotic pseudoaneurysm and not true degenerative atherosclerotic aneurysm, and this may have contributed to its large size and rupture opposed to thrombosis or embolization with distal ischemia. The emergent presentation of a rapidly expanding pulsatile mass with evidence of distal ischemia in our patient led us to proceed directly to the operating room for rapid aneurysm decompression, control of hemorrhage, and revascularization. Now knowing that this was a rupture of a tibioperoneal aneurysm with adequate anterior tibial artery runoff, surgical ligation without bypass could have been considered. Surgical ligation of a mycotic tibial aneurysm was successfully described in the literature,[5] and in retrospect, this simplifies the procedure and saves time in the operating room.

Barbano et al[7] described endovascular coil embolization of a 3-cm tibial aneurysm in a young patient. This patient did not have a history of trauma or infection. In selected patients without evidence of active infection or rupture, a primary endovascular approach is feasible. In our patient, the ischemic symptoms were likely arising from compartment compression because of a large aneurysm and hematoma. Emergent repair was required for rapid relief of the compartment syndrome and control of bleeding. The leg exsanguination and use of a proximal tourniquet provided distal arterial and venous control and allowed us to ligate the aneurysm in controlled fashion. This approach was both life and limb saving.

CONCLUSIONS

Infrapopliteal mycotic aneurysms are uncommon, and presentation of a ruptured infrapopliteal aneurysm is even more uncommon. While evaluating a patient with acute limb swelling and distal ischemia, a ruptured popliteal or infrapopliteal aneurysm needs to be included in the differential diagnosis. If the patient is hemodynamically stable and the limb is not acutely threatened, CT arteriogram or catheter arteriogram will contribute to forming appropriate diagnosis and treatment. Definitive therapy can include the operative techniques of proximal and distal ligation, ligation with vascular reconstruction, or, in carefully selected patients, a primary endovascular approach.

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